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OUR CONTRIBUTORS

A. J. YOUNG *has been in charge of the Instruments Section at Head Office for the last eight years. A physicist who graduated at Oxford in 1932, he joined Billingham Division in 1940 and found special interest in instrumentation, which in 1946 led to a transfer to Head Office to set up a central instrument laboratory which specialises in long-term development.*

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BRENDA ELLISON *has been secretary to the works engineer of Broughton Works, Manchester, for the last fourteen and a half years. In the course of these years she married her boss and is now about to retire from the service of the Company, since Broughton Works is being closed down and she does not wish to work elsewhere.*

AUTOMATIC CONTROL

By A. J. Young (Head Office)

Increasing use is made today of ingenious instruments, many of them electronic, which do measurement and sometimes control job better than man. I.C.I. alone will soon be spending at the rate of £1m. a year on new instruments. And a new class of tradesman —the instrument artificer—has come into being. Here is a brief account of this development, which perhaps more than any other stamps the character of post-war industry.

WHAT is this business of automatic control? Why is this phrase so often on the lips of engineers? These are two very legitimate questions. But before they can be answered it is necessary to appreciate what a controlling instrument does.

In broad terms it is true to say that a controlling instrument does some of the work of an operator, but with this difference: the instrument will be more consistent, less liable to fatigue and more rapid in action than a man, but infinitely less "clever."

The man watches an instrument which indicates the value of some variable in the process—say a temperature. He tries to maintain this temperature constant (or to make it vary in a predetermined way) by adjusting some regulating unit; perhaps this is a valve controlling the steam supply to the process. He knows that if he succeeds in controlling the temperature as he wishes, the process will operate successfully to give the proper product.

In some processes the operator's task is more difficult than in others. The most awkward ones are those where the measuring instrument is slow to show the effect of adjusting the valve. This can best be explained by an example.

A very simple one, often quoted, is the process of taking a shower bath. Imagine yourself to be enjoying a shower. You have regulated the temperature to your own comfort by adjusting the usual mixing tap to control the proportion of hot to cold water. All is well until another hot water tap in the house is turned on, reducing the hot supply. You are soon getting only lukewarm water, and promptly make what you think will be about the right adjustment to the mixing tap. But the water gets no warmer, so you turn the tap more to "hot."

In a moment you are scalded and frantically turn the tap in the opposite direction. You are then frozen. You have forgotten that the effect of turning the tap will be delayed until the water already in the pipe between the tap and the spray has all been expelled. The delay can be calculated by dividing the distance between tap and spray by the speed of the water through the pipe. This sort of delay is known technically as "distance/velocity lag."

A homely example like this serves to show how there comes to be such scope in industry for instruments which will do control jobs better than the human being.

There is no need to give all the reasons why the Company will soon be spending at the rate of £1m. a year on new instruments. We all know what the plant operator does and how important it is that he does it well. His skill is reflected in long intervals between plant shutdowns for maintenance and repair, in high quality of products, and in a high yield of product from each ton of coal used in the boiler plant and each ton of raw material processed.

The operator is partner to the chemists who work continuously to improve the processes and to invent new ones, and partner to the engineers who apply their knowledge and experience to designing better plant. His job is to get the most out of plant with the least damage to it, and the whole purpose of the instruments is to help him to do this. Therefore the instruments must above all things be reliable.

For the operator to rely on his instruments they must have dependability built in. But they must also be looked after properly. Instrument maintenance demands a knowledge of light mechanisms, pneumatic systems and electrical (including electronic) circuits, and therefore has led to the need for a new kind of tradesman possessing special qualifications.

The instrument artificer has come into being to meet these needs. In order to be able to look after the wide variety of equipment, he must have a knowledge of light mechanisms and of the electrical circuits and components used in instruments, and the more he knows about the principles of their operation the better he can do his job. Specialised training is, of course, necessary. The larger Divisions provide this in their training schools, which are also open to men from the smaller Divisions. During the last few years the Company has been very active in getting special courses for instrument artificers organised at many technical colleges. Such courses introduce the keen artificer or apprentice to the theoretical background of physics and of electrical and mechanical engineering—a background which is invaluable in day-to-day practical work.

Every year more and more artificers must be trained to maintain the additional instruments installed on all the new plants erected. As a general rule one might say that these new instruments represent about 5% of the capital cost of the new plants themselves.

The instrument artificer's first responsibility is to ensure that the instruments in his care remain reliable as long as they are in service. The instrument maker strives to design increasingly reliable instruments, but his task is made difficult by demands for improved sensitivity and speed of response; sensitivity to make even the smallest change easily visible on the dial, speed of response to give the earliest possible warning when action is needed.

Special Needs Catered For

There is no end to the task of improving instruments in all these respects. That is why the larger Divisions all have their own instrument research section, in which new instruments are always being invented to meet the special needs of our factories and in which the latest instruments produced by manufacturers at home and abroad are examined and tested. Teams of graduates are engaged in a continuous effort to develop better measuring and control equipment and better methods of applying it.

This sort of work is undertaken so that temperatures, pressures, levels, flows, weights and analyses of process materials can be measured and controlled in the widely different conditions encountered in the Company's factories. Enough problems are involved to keep the research sections busy for a very long time. It is also easy to see that the maintenance sections in each factory will be equally busy keeping the instruments in good condition.

But perhaps the most interesting aspect of instrumentation to the majority of people is the development of completely new types of equipment.

New Types Developed

An example is the instrument shown in the photograph on the following page. This particular one was supplied by an instrument manufacturer and is of his design, but is very similar to, and in fact partly based on, earlier designs developed in I.C.I. before any such equipment was commercially available. It is of course quite usual for I.C.I. instrument developments to be discussed with any interested manufacturers and subsequently marketed by them. The instrument shown has now been giving satisfactory results for about fifteen months and further instruments are about to be installed. It measures continuously the

MEASUREMENT BY ELECTRONICS. *Electrons given off from material made radioactive in an atomic pile are directed into the semi-finished leathercloth, and the number of electrons passing through the cloth gives an index of its thickness. Greater accuracy is achieved in the coating of leathercloth with plastic.*

thickness of 'Vynide' leathercloth immediately after the P.V.C. dope is spread on the greycloth on a spreading machine.

At this stage the coating is too soft for any form of mechanical measurement, and before the introduction of the gauge the accuracy of manufacture depended entirely on the judgment and experience of the operator; the only check available was the weight of the completed roll of material after coating. The skill of the operators is illustrated by the fact that they generally manage to keep within 10% of the correct weight. The new instrument shows at once when the material differs from the correct thickness, and the operator can make the appropriate corrections immediately: as a result he can now work to within 5%.

How could you measure this cloth without touching it? There are several possible ways. In this instrument a piece of material made radioactive in an atomic pile is placed on one side of the leathercloth. This material gives off electrons, some of which pass through the cloth: the number that do so is a measure of its thickness.

Several instruments of this kind are in use in Plastics Division to measure the thickness of P.V.C. film leaving the calender, and one has been used to monitor the thickness of rigid P.V.C. sheet. Another is being tried in Metals Division to measure the thickness (around two-thousandths of an inch) of copper strip as it comes from the rolls at a speed of 200 ft. per minute.

Two Outstanding Examples

Of the many new instruments that have been introduced since the war two are perhaps of outstanding interest—the infra-red gas analyser and the mass spectrometer. The principle behind the infra-red gas analyser is that infra-red (heat) radiations are absorbed by some fluids more than by others. For example, the heat we get from the sun is due to the invisible infra-red rays, and if most of these were not absorbed by the water vapour in the atmosphere we should all be very quickly grilled. Gases can be analysed by measuring the percentage of these heat rays which they absorb, and the infra-red gas analyser is being used more and more for this purpose. Similar instruments are based on the absorption by gases and liquids of visible light and of the invisible ultra-violet rays.

The mass spectrometer is far too complicated to explain satisfactorily in a few words. Roughly speaking, it does the opposite to a chemical process, taking chemicals apart (by bombarding them with high-speed electrons) instead of putting them together, and then sorting out the resulting parts electrically according to their weights so that the amount of each in the original gas or liquid can be recorded.

When the sample put into the instrument is itself a mixture of chemicals, as is usually the case, then the results of this reshuffle can be interpreted to give the composition of the mixture only after a very laborious mathematical analysis. Fortunately an additional instrument (called a computer, for obvious reasons) can be installed alongside the mass spectrometer to do the calculations for the mathematician and present the answers on the spot.

Need for Measurement

Now, these three instruments so briefly described have one thing in common—they are used for measurement rather than for automatic control. It is natural to consider the measurement first, because no man or instrument can control anything without somehow measuring it first. Even when we can measure, some processes (like the shower bath) are more difficult to control than others.

Generally speaking, pressures and flows are fairly easy to control, but temperatures are more difficult; and the quality of a plant product (e.g. its purity, analysis or thickness) is often very difficult indeed to control automatically.

A great deal of effort to improve automatic control techniques is being expended in this country, in America and elsewhere. Much has been achieved, but there is still a great deal to be learned, both about controlling existing plants and about designing or modifying plants to make it easier to control them well. In I.C.I. chemists and engineers are pooling their knowledge and experience with the instrument specialists to ensure that progress is as rapid as possible.

Role of Automatic Control

The part played by automatic control in the chemical plants of today can best be appreciated by a comparison with a typical new plant of twenty years ago. Such a plant was usually housed in a large building; operators adjusted wheel valves to control the process, and often spent their whole shift in conditions far from ideal. Such few automatic controllers as were to be found were usually actuated mechanically, by oil or water pressure, or by electrical contacts and motors; controllers and measuring instruments were installed beside the pipes or vessels to which they were related and were scattered around the building on several floors.

Today's plant is very different. Much more of it is in the open air, and the operator is in an air-conditioned room, sitting at a control desk or watching a panel, while banks of controllers make adjustments continually to hold flows, pressures, temperatures, etc., at the settings he has specified. Almost all the controllers are actuated by compressed air, a great variety of versatile and largely interchangeable pneumatic controlling instruments having become available in recent years.

(*Continued on page 329*)

One man and his job—24

P.V.C. PROCESSMAN

GEORGE JOHNSON, process worker at the Hillhouse Works of Plastics Division, lifted the ram of his Banbury machine and let me look inside. A mass of pure-white substance, as sticky and appetising as the contents of a cream bun, was tumbling about between two rollers. "She's done now," he said, and suddenly the contents of the Banbury disappeared.

He hustled me down an iron ladder and lifted the casing off a conveyor belt which ran beneath the platform of his machine. We were just in time to see the white mass disappear up an incline into the jaws of another machine. George led me round to the front of it, and just as we arrived there our quarry emerged again—this time in the form of a wide, flat strip. An operator threaded the strip over a roller and through a trough of water.

George urged me up more ladders until we were standing beside a quaking, screeching giant of a machine. From it tumbled a mass of white chips. At the delivery end men were receiving the chips in paper sacks. The sacks were marked 'Welvic' P.V.C., and at last I knew what it was all about.

George's job is an important link in the long chain of processes by which 'Welvic' brand of the versatile plastic polyvinyl chloride, used for everything from raincoats to children's toys, is made. P.V.C., like its more expensive brother polythene, starts life as a gas. The gas, vinyl chloride, is made by General Chemicals Division on the Hillhouse site from acetylene and hydrochloric acid. For the sake of convenience, it is liquefied, by being refrigerated to something under — 13° C., before being pumped to the Plastics Division storage tanks.

The gas is persuaded to become a plastic by being "pressure cooked" with water and a catalyst. It is one of those mysterious reactions that take place unseen inside a heavy steel vessel; the only hints of the turmoil that goes on inside the vessel are the thickness of its walls and the blow-off valve provided at the top in case the reaction gets out of control. The effect of the "pressure cooking" is to rearrange the separate molecules of vinyl chloride into a long chain, the simple monomer becoming a polymer. The resulting milky-white liquid is then filtered and dried to give a fine white powder.

This is George Johnson's raw material. But before it goes to his machine it is mixed with a chemical called a plasticiser, and if necessary with pigments. George receives the mix in troughs containing 65 lb. each, and tips two at a time into the mouth of his Banbury machine.

Inside the Banbury two eccentric heated rollers revolve at moderate speed, tormenting the mix.

"What is the point of the process?" I asked.

In their explanation the chemists reminded me of the original catalytic reaction which had produced a long-chain plastic from the simple gas. When the plastic is taken from the autoclave "pressure cookers" and dried, it is in the form of a white powder. This must be mixed with plasticisers to produce compounds of a range of flexibility and it is in George Johnson's Banbury that this mixing is carried out.

As soon as the batch went into the machine George noted the time and temperature on a record sheet. According to the grade of 'Welvic' being produced the mix is subjected to a certain temperature, and perhaps the most responsible part of George's job is to keep this temperature within bounds. If the mix gets too hot its chemical composition will start to break down and a pinkish tinge will begin to appear in the plastic. The temperature at which XX, a clear grade of 'Welvic,' begins to break down is comparatively low. "That's the trickiest grade," said George. "You have to watch the temperature gauge like a hawk."

Every now and then he lifted the ram of his machine and peered at the tumbling mass inside; equally often he noted the time and temperature on his record sheet.

Ten minutes is the average time a batch takes to gel. At the end of ten minutes when George looked at the batch it had lost its powdery nature and become slightly sticky. At once he lifted the trapdoor at the bottom of the machine and the doughy plastic fell on to the conveyor, passed through the rollers, through the water trough, up to the mill and down a chute in the form of chips . . . which is where we came in.

M.J.D.

George Johnson

Information Notes

A SCIENTIST LOOKS AT SCIENCE FICTION

By John Lewis (Head Office)

In the last few years science fiction has leaped into popularity—and not only among children—almost unnoticed by serious scientists. Here a member of I.C.I.'s Research Department repairs this omission and honours the science fiction writers for firing our imagination with new possibilities.

HAVE you noticed that the shapely lady on the paper-covered magazines in your local bookstall has lately taken to wearing a curious helmet with wires on it? She is not just a bathing beauty any more; she is a Virgin from Venus, and is probably being carried off by a Monster from Mars. True to tradition, she wears very little besides the helmet—the climate on Venus, we are assured, is very warm! But it is interesting that she has the helmet. Can science be rivalling sex-appeal for exciting popular interest?

Certainly there is a tremendous vogue for what is called science fiction just now. Stories about interplanetary travel, life on other planets or the shape of things to come on earth are no new thing by any means—H. G. Wells, Conan Doyle and Edgar Rice Burroughs were writing them well before I was born, and the great classic of them all, Frankenstein, was before my grandfather's time; but these themes have never been so popular before.

Advertisers say they can sell anything to children today—even soap—if only it can be dressed up as part of the equipment of Dan Dare, space-pilot of the future. And it is not only children's comics that are affected. There are monthly and quarterly magazines devoted entirely to science fiction which sell all over the world in tens of thousands to adults, and round them there has grown up a sort of cult, with almost a language of its own. Eager letters are exchanged between readers about whether or not last month's issue contained too many B.E.M.s—which does not refer to holders of the British Empire Medal, but to Beady Eyed Monsters. A science fiction fan is referred to as a sffan, and the plural is sffen.

Recently Hollywood invaded the field too, with all the realism of 3D. And even the B.B.C. has had to yield to the demand—interplanetary flight has formed the subject of serials on the Light Programme and on television.

What does it all mean? I think it is happening because people have just begun to get round to the enormous potentialities offered us by science and it has fired their imagination; Wells and the rest were simply ahead of their time in this.

Of course, a great deal of science fiction is hopelessly unscientific in that it deals with things which present-day science does not even foresee, and some of it actually contradicts known scientific laws. Some of it, too, is curiously naïve: for instance, writers about life on other planets often assume that those planets will have seasons as we do, although there is no reason at all for believing that any other planet will have its axis of rotation tilted in relation to its plane of rotation round the sun, which is what causes our seasons. But to my mind this sort of thing is not so very important.

. . . contradicts scientific laws

It is desirable, certainly, that the worst errors should be avoided, if only in order that readers with some real knowledge of science should not be made to laugh the whole thing out of court. There is, in fact, a movement among science fiction writers now to lay down certain basic standards of good writing rather in the way the Detection Club lays down standards for the good detective story. With detective stories, for instance, it is essential that the reader should be given a fair chance to solve the mystery for himself and that things like police procedure or law should not be too flagrantly misrepresented. Similarly the better science fiction writers recognise that it is desirable not to use any absolute contradiction of known laws of science and certainly not to represent something as being actual scientific fact if it is not.

But beyond that I believe it is important that writers should be as free to use the imagination as possible. For what science has done in firing people's fancy is to restore to us something much older and much more important than science itself, namely the ability to go out in imagination beyond the confines of earth and everyday life. It is just this capacity for universal imagination which makes us different from animals, psychologists have suggested, and without it we should never have been able to invent science.

Today we may laugh at the medieval philosophers who discussed how many angels could dance on the point of a needle; but in fact it was by imagining angels flying through space and by toying with the idea of extending human power by magic that they oiled the wheels of the mind sufficiently to produce science. And it was therefore a tragic, cramping thing when the discoveries of science seemed to have made such flights of fancy absurd. If now science itself has opened the door again to universal imagination, it is a good thing.

There are actually considerable similarities between the things science fiction deals with and the things people thought about in terms of angels and magic in earlier days. The angel of wrath who used to be imagined as coming down to punish human beings for their wars and cruelty often reappears in modern stories as a representative of the Inter-Galaxy Police. The god from Olympus who gave human beings the benefit of his superior wisdom in the old Greek tales comes back in the guise of a super-electronic computer. The demons who used to be thought to cast spells on people come back today as evil supermen sending out "thought-waves."

. . . the axis of rotation

But science fiction is not mere escapism, as some people have suggested. Rather the reverse.

Time and again the destruction of mankind by atomic war is foretold. Visions of the future are more often grim warnings of new possibilities of dictatorship (by means of "thought-reading machines" and the like) than rosy visions of Utopia. Tales of life on other planets are often used to point a sharp moral about human behaviour—such as the story I read recently (in an American magazine, too!) of how Earth, many centuries in the future, offers financial aid to two other planets which have devastated each other by atomic war, and how one accepts the aid only to find that its culture has been subtly undermined by the Earth way of life, while the other, which takes the hard way to recovery by its own efforts, retains its integrity.

This story, of course, does not represent a full use of the possibilities of science fiction—its parallel to everyday affairs is too close. And the same may be said of many other of the lesser stories—they are simply straight adventure or human interest stories, told in a new setting which when all is said and done does not add much to them. The story of the brilliant young rocket scientist, Gale Garth, who is ruined by addiction to a new drug called "dew-log" but regains his self-respect by saving a rocket ship from plunging into the sun after it had been abandoned by its rascally captain for the value of its insurance, might, for instance, equally well have been set on an ocean-going tramp on earth.

The really first-class science fiction stories do much more than this—they exploit the new ideas to say something that could not be said in any other way.

Ray Bradbury, an American author, has attracted quite a lot of attention from highbrow critics lately because he has shown himself able to do this. One of his stories tells of a room which, by a clever combination of 3D cinema and other effects, brings your thoughts completely to life around you, and he shows how this causes disaster. Another tells of a race dying of germ warfare on a distant planet. They build a completely automatic city which will, in time, wreak revenge on their attackers from Earth by sending Earth's own space-ships back with germ bombs. Here really new possibilities are explored.

Another author of note is Britain's own Arthur C. Clarke. He knows a great deal about the real engineering problems associated with space travel, for which Ray Bradbury does not care a fig, and his novel about the ultimate destiny of the human race, *Childhood's End*, is most moving.

But perhaps the most important thing that science fiction does is to provide us with a twentieth-century equivalent of folk-literature. Here, in the paper-covered magazines written and read in such vast numbers, we find the symbolic expression of the same basic hopes and fears of ordinary people which were the subject of the myths and legends of the ancient world.

How often the great themes of those old legends come back in modern guise in stories written by people *who do not seem to know anything about folk-literature at all*—such as the story called "Incomplete Superman," which repeats in terms of a supposed "next stage of evolution" the old legend—which seems to occur all over the world—of gods who marry mortal women and produce half-divine children with incomplete magic powers. It is almost as though there is some deep memory in us which holds these tales without our knowing it.

AUTOMATIC CONTROL *(continued from page 325)*

Probably one's first impressions of the plant of ten years hence will be very similar. The control room has no doubt come to stay, but it may become more compact and more functional, using only the equipment that the operator must watch or manipulate. It seems probable too that the manipulation will be further reduced; electronic controllers, which are now seen only occasionally, may well oust many of the pneumatic ones, and the individual controllers are quite likely to be directed by devices of the "electronic brain" type.

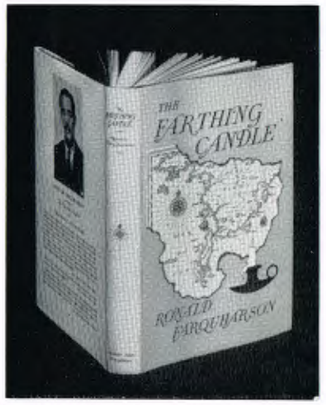
What are the gains to be derived from controlling more plant automatically? The ones that are most often quoted are improved product quality, decreased reject product, and saving in fuel and raw materials: in fact, increased productivity.

But there are other and possibly more important gains. In addition to increasing productivity and probably conserving plant (by decreasing the wear and tear due to fluctuating operating conditions) the extended use of automatic control should release men from routine jobs for more valuable and interesting work: work demanding the skill, and above all the judgment, which are the unique possessions of man.

ROUND THE WORLD WITH A SENSE OF HUMOUR

Mr. Ronald Farquharson, I.C.I. Shipping Manager and author of Confessions of a China Hand, *has written a new book called* The Farthing Candle, *published by Hodder and Stoughton at 12s. 6d. It is here reviewed by Mr. P. C. Allen, Group E Director.*

MR. Ronald Farquharson has given us another pleasing book of reminiscences with the intriguing title *The Farthing Candle*, to follow on his charming and successful first book, *Confessions of a China Hand*.



The title of the book was a challenge requiring some research, which revealed that it came from *Love of Fame*, by Edward Young, who was Rector of Welwyn in the eighteenth century and is still a figure spoken of in my old village. The world is indeed a small place.

In his new book Mr. Farquharson describes a wider range of scene than before, taking us round the world to look in on post-war Vienna and present-day Kenya, and on a voyage to Egypt in a merchant ship, recounting the straits in which he found himself in Alexandria, virtually without money, before he and his wife could get home again. Then there are two returns to the Far East, one describing an unusual conversation in Korea and the other in praise of rickshaws.

Another chapter which appealed to me particularly from past associations is a character study of one of the I.C.I. river Weaver steamer captains whom Mr. Farquharson met when he was ship's husband of the *Millicent*. Mr. Farquharson's sense of character comes most to the fore in his two ships' captains, I think, though he does produce for us another rare bird in the country sheriff in America who gave him tea and fined him five dollars. This last is part of a most amusing description of Mr. Farquharson and a friend crossing the United States in a motor car which was worth no less than fifteen dollars when they finally parted with it in New York. Then, in the sharpest possible contrast, the book ends with a chapter which is really a ghost story.

All this and more besides Mr. Farquharson makes interesting, amusing and human, and if at times he gets his laugh from you, he contrives to wring a tear from you also. All of which is no more than saying that Mr. Farquharson manifestly knows how to write, has a real sense of life and character, a sense of humour and, what particularly appeals to me, a fine sense of the ridiculous which happens to match my own. I can indeed say that his nonsense suits our nonsense and not—to quote Edward Young back at him—that one man's anguish is another's sport.

If I may be allowed to prefer some stories in Mr. Farquharson's earlier book, notably "Tally Ho" and "Return to Eden," to any he has given us in the new, I would none the less most cordially recommend *The Farthing Candle* for autumn reading and Christmas giving.

A NEWCOMER TO PLASTICS

By K. B. Bartlett (Plastics Division)

Polytetrafluoroethylene, or P.T.F.E. for short, discovered in America during the war and now manufactured by I.C.I., is a comparative newcomer to the plastics world. Its outstanding characteristic is the way in which it stands up unscathed to extremes of weather, temperature, and attack by other chemicals. Unusual too is the way in which it obstinately refuses to stick to anything; and even water will not wet it. These properties make P.T.F.E. in demand for many special uses.

A REMARKABLE new plastic outstanding for its resistance to chemical attack, to weathering and to very high temperatures, and for its extremely good high-frequency insulating properties, recently began to be manufactured on a commercial scale at the Hillhouse Works of Plastics Division. The name of this plastic is polytetrafluoroethylene, and it is sold by I.C.I. under the trade name 'Fluon.'

Polytetrafluoroethylene (or P.T.F.E. for short) was first described in an American patent of 1941. It had been discovered quite by chance during research on refrigerants. In this research programme the gas tetrafluoroethylene was being used as an intermediate, and was stored in cylinders under pressure. When one of the cylinders came to be used it was noticed that there had been a drop in the pressure but no loss in weight—in other words, something had happened inside the cylinders. On investigation it was found that a white solid had formed. This proved to be polytetrafluoroethylene, the commercial manufacture of which began in America in 1943.

P.T.F.E. is outstanding in many ways. To begin with, its chemical resistance is unique among plastics. It is attacked by nothing except the molten alkali metals, such as sodium and potassium (and in some circumstances by fluorine). It is completely unchanged by exposure to any combination of ultra-violet light and weathering conditions. It is not wetted by water, and as an insulating material it is in the same class as polythene. But perhaps the most remarkable of all P.T.F.E. characteristics is the way in which it does not stick to other substances. It has a very low coefficient of friction—about the same as that of wet ice on wet ice.

With these valuable properties is combined another in which P.T.F.E. is outstanding. It has a very wide working temperature range—from 100° to 300° C. This range is wider than that of any other plastic and even that of the silicone rubbers. While on its chemical, weathering and electrical properties alone P.T.F.E. would be an important industrial material, the combination of these with excellent resistance to high and low temperatures increases its importance considerably, making it invaluable and unrivalled for many applications.

. . . the name is polytetrafluoroethylene

The resistance of P.T.F.E. to high temperatures has made it necessary to develop certain special techniques for its fabrication, techniques which are similar to those used in powder metallurgy. Unlike most thermoplastics, P.T.F.E. does not flow under pressure at high temperatures. However, at 327° C. it changes from a granular solid to a jelly-like mass, and this change is the basis of all fabricating techniques using P.T.F.E.

The cold powder can be compressed into preforms, which are strong enough to withstand careful handling. Simple small shapes are made by baking preforms—the technical phrase is "sintering"—in an oven at about 350° C. The mechanical properties of the moulding can be varied within certain limits by the method of cooling adopted. Larger shapes are made by a pressure-sintering technique in which preforms are heated to above 327° C. and cooled, pressure being applied during the heating and cooling cycle. More complex shapes are made by coining—that is, allowing sintering preforms to cool to just below 327° C. and then stamping them in a coining mould. Fortunately P.T.F.E. is very easy to machine and components can therefore be made without difficulty from simple stock mouldings.

The uses of P.T.F.E. may be grouped broadly into three classes: chemical applications, electrical applications, and general applications where extremely low friction or freedom from sticking is required. These applications can be listed as follows:

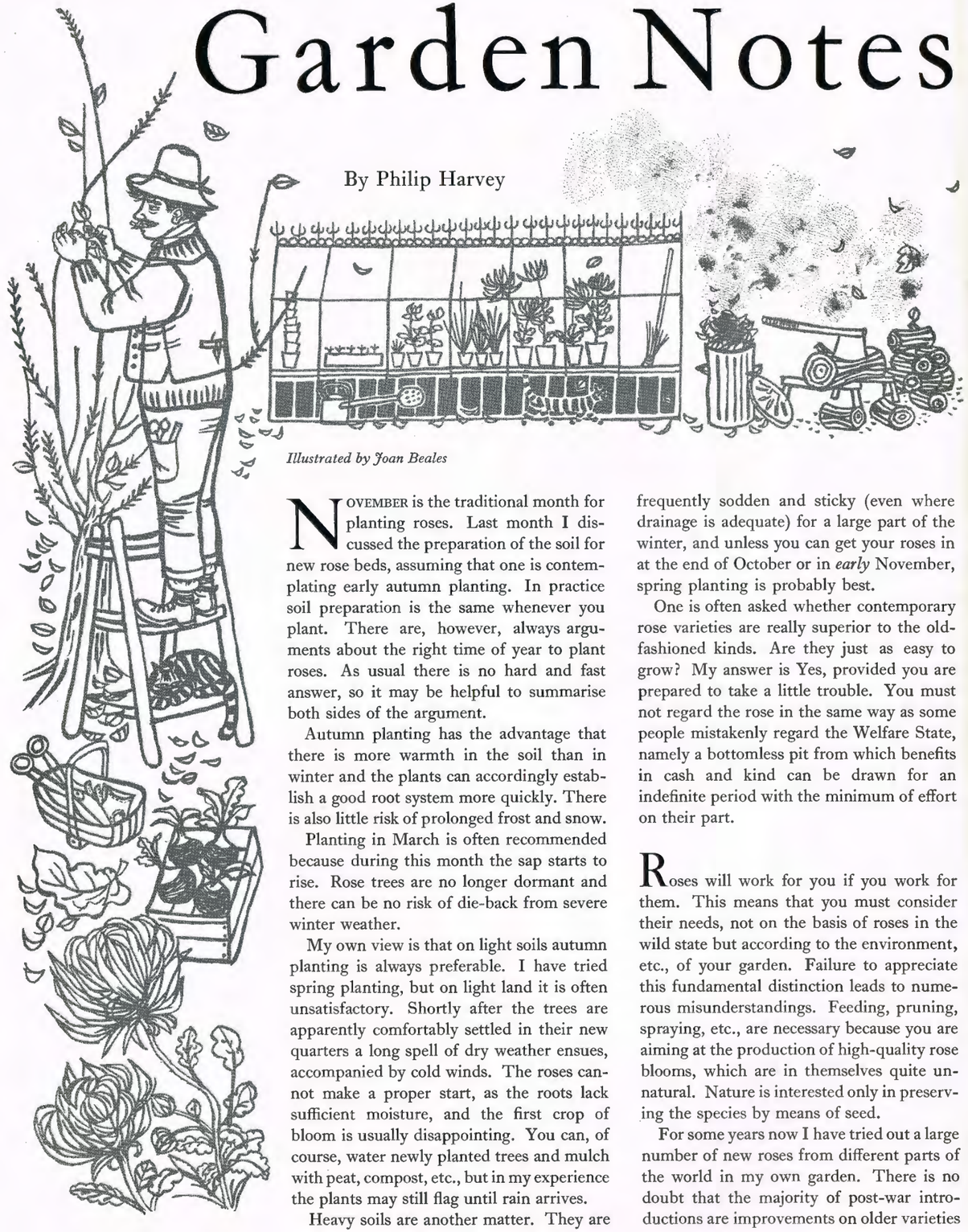
1. *Applications in Chemical Plant.* Here P.T.F.E. is used for gaskets, packings, diaphragms, seating discs, valves, nozzles, pumps, bellows, back-up rings, small vessels and flexible couplings.
2. *Electrical Applications.* These are almost entirely those in which high dielectric efficiency at very high or very low temperatures is required. The temperature consideration is important, since there are other materials having equally good electrical properties but a narrower range of safe operating temperatures. In addition, the fact that P.T.F.E. is not wetted by water is useful, since this means that it can be used in very damp conditions without loss of efficiency.
3. *Applications requiring Freedom from Sticking.* Here the bakery trade provides a striking example. Bakery sheeting rolls are normally made of highly polished stainless steel and fitted with accurately ground scrapers, which must be reground frequently to maintain their efficiency in stripping wet, sticky dough from the rolls. Regrinding the scrapers means, of course, putting the sheeting rolls out of operation. If, however, the rolls are covered with P.T.F.E. the dough does not stick, ground scrapers are not required and valuable production time is not lost. Other like applications include covering rollers of various sorts in the textile, paper, cardboard and carton making industries and in plywood and veneering plant; lining or covering machine parts, guides, feed hoppers and chutes that come into contact with paints, printing inks, ceramic clays, chemical mixtures, detergents and soap products; as end plates for calender and paint mill rollers; for covering press platens; as a mould separating agent; as a buffer for the heat-sealing jaws of wrapping machines to prevent plastic films and wax papers sticking to the heater jaws; and for silent-running, self-lubricating bearings of P.T.F.E.-impregnated metal.
4. *Special Applications.* P.T.F.E. is used for hermetic seals where its "plastic memory" can be utilised. These applications rely on the fact that components assembled at low temperature and under strain will attempt to get back to their original unstrained state as the temperature is raised, thus ensuring a tighter fit. It is also used for piston rings for high- and low-temperature work, and for bellows and diaphragms that remain flexible at very low temperatures, uses where its wide operating temperature range are exploited.

The economics of the use of the material are straightforward. P.T.F.E. components are quite expensive, but this cost is quickly offset—first because a P.T.F.E. component will last many times as long as a similar item in any other material, and secondly because, as a result of the long effective life of the component, plant shutdowns for maintenance and replacement are reduced to a minimum.

Many examples of this could be given. For instance, in a certain plant handling fuming sulphuric acid it was once necessary to replace packings every two days; with P.T.F.E. packings no replacement has been necessary after two years of operation. In another plant, where a lachrymatory substance was handled, P.T.F.E. gaskets were reported leak-proof a a year after their installation: the gaskets formerly used had been replaced every few days.

Garden Notes

By Philip Harvey



Illustrated by Joan Beales

NOVEMBER is the traditional month for planting roses. Last month I discussed the preparation of the soil for new rose beds, assuming that one is contemplating early autumn planting. In practice soil preparation is the same whenever you plant. There are, however, always arguments about the right time of year to plant roses. As usual there is no hard and fast answer, so it may be helpful to summarise both sides of the argument.

Autumn planting has the advantage that there is more warmth in the soil than in winter and the plants can accordingly establish a good root system more quickly. There is also little risk of prolonged frost and snow.

Planting in March is often recommended because during this month the sap starts to rise. Rose trees are no longer dormant and there can be no risk of die-back from severe winter weather.

My own view is that on light soils autumn planting is always preferable. I have tried spring planting, but on light land it is often unsatisfactory. Shortly after the trees are apparently comfortably settled in their new quarters a long spell of dry weather ensues, accompanied by cold winds. The roses cannot make a proper start, as the roots lack sufficient moisture, and the first crop of bloom is usually disappointing. You can, of course, water newly planted trees and mulch with peat, compost, etc., but in my experience the plants may still flag until rain arrives.

Heavy soils are another matter. They are frequently sodden and sticky (even where drainage is adequate) for a large part of the winter, and unless you can get your roses in at the end of October or in *early* November, spring planting is probably best.

One is often asked whether contemporary rose varieties are really superior to the old-fashioned kinds. Are they just as easy to grow? My answer is Yes, provided you are prepared to take a little trouble. You must not regard the rose in the same way as some people mistakenly regard the Welfare State, namely a bottomless pit from which benefits in cash and kind can be drawn for an indefinite period with the minimum of effort on their part.

Roses will work for you if you work for them. This means that you must consider their needs, not on the basis of roses in the wild state but according to the environment, etc., of your garden. Failure to appreciate this fundamental distinction leads to numerous misunderstandings. Feeding, pruning, spraying, etc., are necessary because you are aiming at the production of high-quality rose blooms, which are in themselves quite unnatural. Nature is interested only in preserving the species by means of seed.

For some years now I have tried out a large number of new roses from different parts of the world in my own garden. There is no doubt that the majority of post-war introductions are improvements on older varieties and can be confidently recommended for the average garden. Here are some newer varieties worth a place in any garden.

Sutter's Gold is an American hybrid tea which has gorgeous, reddish-gold buds. These buds are among the finest found in any variety, new or old, and the fragrance is very strong (this is the rose to give to anyone who complains that modern roses are scentless, as it was only introduced in 1950). After these remarkable buds, the open bloom is perhaps a little disappointing. The colour is yellow with pink flushes. Sutter's Gold is a vigorous grower, produces its large blooms on long stems that are excellent for cutting, and is, I think, less thorny than the majority of roses.

First Love usually appeals to the ladies. It is essentially a woman's flower, the various shades of pink making a general colour effect that is both subtle and refined. Personally I like the long points to the petals, and in the bud or half-open stage First Love is very beautiful. Alas, the open bloom lacks sufficient petals, and you would need the nose of a bloodhound to appreciate the so-called fragrance.

Another very attractive rose for cutting and decoration work is Michèle Meilland. This rose can truthfully be described as dainty, but it is in no way insipid. The colour is between salmon and coral, and the petals reflex from a high centre. If your wife wants a rose to decorate the dinner table, try Michèle Meilland. Incidentally, this rose tolerates very dry soils.

I was very interested to see the excellent colour photograph of the Auchincruive Climax strawberry in the August issue. Though introduced as recently as 1947, it is, I believe, more widely grown than any other variety in this country—and no wonder. The trusses are held well above the soil, and with good cultivation it will often carry quite a heavy second crop in autumn, expecially if cloched. The flavour is good (perhaps not equal to Royal Sovereign, but that is a very high standard to set).

Though Auchincruive Climax is resistant to that highly damaging disease known as red core, which is generally most serious on badly drained soils, it has succumbed in many places to an entirely different trouble. This consists of a breakdown characterised by distorted leaves and reduced cropping ability. Infected plants may turn completely yellow, eventually collapsing. Some experts advise that this variety should no longer be planted, at any rate on a commercial scale; but in many gardens, including one on the opposite side of the road in which I live, there are still beds of Auchincruive Climax that show no signs of deterioration. I understand that the raiser has several promising seedlings under trial which may ultimately fill the gap.

ANDORRA

By R. J. Fowler (Metals Division)

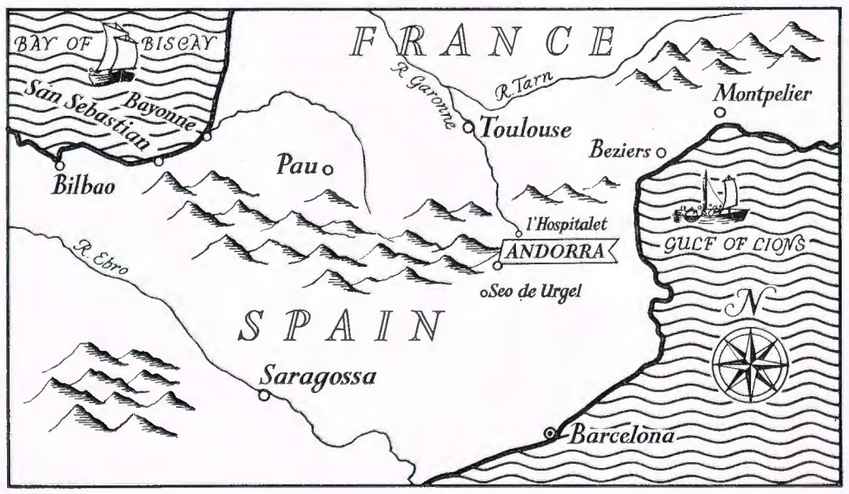
The little state of Andorra, poised in the Pyrenees between France and Spain yet independent of both—how attractive it sounds, so remote from the power politics of Europe! Here is the story of an unusual visit to an unusual but lovely land.

ANDORRA, that miniature independent state with the lovely name, nestling high up in the Pyrenees between France and Spain, is indeed something unique. To begin with, it has two co-princes: the Spanish Bishop of Seo de Urgel and the President of France. Everything seems to run in pairs. There are two post offices, Spanish and French, each issuing a different set of stamps. There are two official languages, again Spanish and French, although in fact most people speak Catalan, the dialect of Catalonia, almost a language on its own. And the rate of exchange is in fact rather better than the official one, so one can live in reasonable comfort in Andorra for less than £1 a day, French and Spanish money being equally acceptable.

In size Andorra is slightly larger than the county of Rutland. The population is about 6000. For those in the town the chief source of livelihood appears to be the seasonal tourist trade. In the valleys a scant living is wrung from the soil by unstinted hard work, with the additional spice of a spot of smuggling, which the guide book speaks of as a "popular avocation."

A NOVEL METHOD OF EN *set off on a steep climb to*

TRY INTO FRANCE—*by caterpillar tractor from Andorra over a snowbound pass still officially closed. Here the party is about to the summit. Arrival in France was the late Ernest Bevin's ideal—no passports, no customs: just a notification to the gendarmerie.*



I arrived in Andorra in May this year, having made my way there from the beautiful Costa Brava of north-eastern Spain. It was rather early in the season and the mountain snow had not then melted.

The bus journey from Seo de Urgel was a long and rather tiring one. As darkness fell we were still winding our way up the twisting valley. Then a road barrier was lifted to permit entrance, and Andorra had been reached. Passing through Andorra town itself the bus stopped at Les Escaldes, a mile up the valley, and I emerged to be greeted by a hotel manager who spoke very good English and had been educated at Barcelona as an architect. Soon there appeared an excellent repast which included a delicious trout caught the same day from the mountain stream that thundered incessantly beneath the windows like an express train.

The next day I began to occupy myself with the problem of getting on from Andorra into France and so home. Imagine my consternation when I was told that the road to France was still closed because of the snows and that the bus journey back into Spain would have to be endured all over again in order to enter France by the southern route. However, by good chance I came across someone who spoke a little English and the subject of crossing into France was again broached.

"Of course, the road is closed," he said. But as luck would have it he was proposing himself to cross over to France on foot the next day. It would be a twenty-mile walk, but I could join him if I liked. I agreed at once. It was arranged that we should catch the one and only bus to Soldeu which left at eight o'clock in the morning. From here we were to trek over the snowbound pass and would hope to reach French civilisation before nightfall.

That afternoon I spent my time exploring the exquisite valley which leads to the Tristanya lakes, and was lucky enough to get a lift from a lorry up a tortuous eight miles of road winding through steep gorges, tunnels hewn through the rock and picturesque villages. The surrounding hills were capped with snow and the lure of the mountains beckoned me ever on. Eventually, as the shadows lengthened, I returned somewhat wearily to the hotel and was glad to fall into a hot sulphur bath, the water of which came from natural warm springs nearby.

There awaited me a pleasant surprise. My friend had rung up to say he would be leaving in a jeep at six o'clock, and instead of the twenty-mile walk there was a prospect of a caterpillar tractor negotiating the snowbound pass. This was good for morale, and I dined well.

The next morning, which was Sunday, I was in the village square by ten to six. It was hardly light, but the snow of the distant mountain peaks was tinted pink by the still-hidden rising sun. The sky was clear and all augured well when, rather to my surprise, the promised jeep

A TYPICAL VALLEY IN ANDORRA, *looking north towards El Serrat*

appeared. There were five of us plus the driver, a situation which led to a most animated discussion rather lost on me, since my conversational resources were just a little basic French.

Up and up we toiled for some fifteen miles as gradually the sun lit up the surrounding heights. First there were just patches of snow in isolated gullies, then quite deep drifts. Finally a little beyond Soldeu the road was obviously impassable, and the jeep was exchanged for a caterpillar tractor. There was just time for a quick coffee, and then the climb began.

The only means of knowing we were on the right road was the line of long poles embedded in the snow. These poles were our guide. By now we had been joined by a girl equipped with skis, and a curious sight we must have looked as we crept slowly up the snowy slopes surrounded by an everwidening panorama. The tractor was certainly not well sprung, but it had a low centre of gravity—which was just as well, since repeated precipitous bends had to be negotiated. Finally the summit was reached. Here we found a hut and a party of skiers preparing for descent. The sun was now shining brightly, and the glare was intense from the glistening snowy wastes on either side.

The drop down towards France was exciting, to say the least. Instead of following the hairpin bends on the road the tractor made a bee-line down to the valley. I held on grimly. Far below could be seen Pas de la Casa, which is at the Franco-Andorran frontier. This was our destination. There were several skiers from the valley labouring up the slopes, and they paused and watched our hazardous descent. However, we reached the frontier without mishap and rolled into France down a few miles of winding road.

The French customs house and frontier post were not manned, as the route was officially closed. The tractor carried me on to a road junction, where a car was procured to take us the last seven miles to L'Hospitalet. I reported to the gendarmerie, who quite unconcernedly registered my entrance into France.

From then on my journey was an uneventful one by train. As we slowly dropped down towards the blue of the Mediterranean I watched with a tinge of regret the snow-capped mountains recede further and further until they faded away into the azure sky, leaving me with memories of white-crested peaks, barren snowy wastes, lush green valleys and rushing torrents—unforgettable scenes from that entrancing land of Andorra.

Birth of a Butterfly

By Francis Baranyovits
(Hawthorndale Research Laboratory)

While on holiday in Switzerland Francis Baranyovits was clever enough to do two things—spot that a very ordinary-looking caterpillar was the larva of the rare Apollo butterfly, and then keep his eye on the butterfly just as it was hatching out. Some remarkable colour photographs of the Apollo in different stages of development were the result.

(*Photographs by the author*)

EVERYONE has heard about the edelweiss wearing its delicate "fur coat" on the exposed rocks or on edges of dangerous overhanging cliffs, and about the alpenrose, the dwarf rhododendrons of the sunny slopes. Many may possess a pressed gentian flower in a book to remind them of some happy hours on the alpine pastures. But what about the fauna of these altitudes? Who has heard about the Apollo butterfly?

This rare and beautiful insect belongs to the attractions of the Alps as much as the edelweiss and gentian. To distinguish it from other insects in the animal world the name *Parnassius Apollo* was given to it, after the Greek mount of muses and the god of light. It is believed to be a glacial survival in the Alps. In spite of the fact that its host plant, the stonecrop (*Sedum album*), is seen growing at the lower altitudes also, this insect only breeds in the heights between 2000 and 7000 ft. Nowadays it is under protection in most of its breeding areas, because in some places it was completely eradicated by enthusiastic collectors.

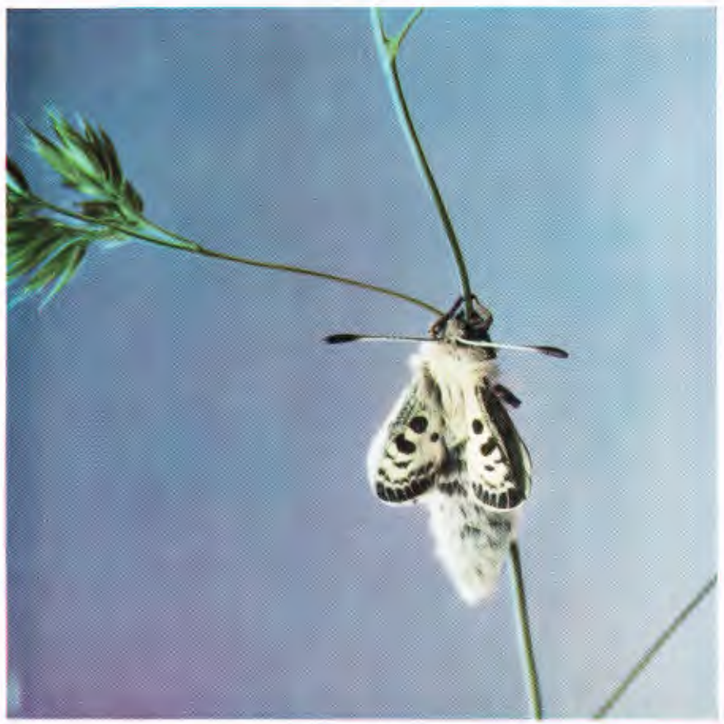
From May till the end of August in warm sunny weather the butterfly can be seen flying sluggishly above the alpine pastures visiting various flowers. But as soon as the sun is covered, even by a small cloud, the Apollo will disappear and will not fly again until the sun is out once more. Its life really depends on intensive sunshine. In cloudy or cold weather it is easy to catch while at rest.

I first saw this butterfly in Switzerland at Flims in the late summer at about 6000 ft., and I was a little disappointed. Its wings were badly damaged, there was hardly any decorative pattern left, most of the scales were rubbed off, and it was a sadly weathered late survivor. I felt I should not take photographs of it in that condition, for I hoped to find another one still fresh and unhurt some time in the early summer.

A few years later a Swiss friend invited me for a holiday in Prato, above Lugano in the vale of Maggia. He wanted to show me the still undisturbed natural beauty of this valley, which is his home. On Easter Monday it was a lovely sunny day and we decided to have our picnic lunch high up at San Carlo. On the way there my friend wanted to show us his favourite "pets"—the big emerald lizards. We found these beautiful reptiles sun-bathing on the stone wall. Their bluish-green skin was sparkling in the sunshine.

As we watched them we noticed a blackish caterpillar busily walking towards them. It was a very ordinary-looking creature; I do not think anybody would bother to look at it, but we did so because we thought it would be

1 Caterpillar moves to new resting place just before pupation



2 Apollo butterfly just emerged, wings very small and not yet erect

3 Fifteen minutes after birth—wings larger and semi-erect but still soft

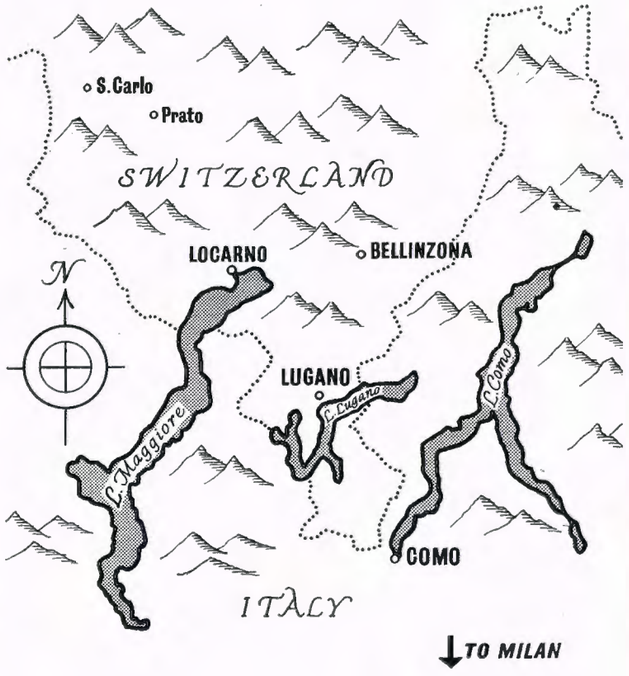
4 Twenty minutes after birth—wings nearly erect (slightly enlarged)

5 Thirty minutes after birth—wings fully erect but still not firm

6 Sixty minutes after birth—the Apollo ready to fly (actual size)

interesting to see how the motionless lizards would react. Would they attack it? But as it happened we never found out, because my friend suddenly realised that this caterpillar might be the larva of the Apollo butterfly. So we frightened the lizards away and they disappeared between the stones like greased lightning.

I took a few photographs of the caterpillar in its natural environment and then we decided to take it with us. There was a good chance of breeding the butterfly from it, and then I would be able to take photographs of a freshly hatched, undamaged specimen. I felt somewhat guilty in taking this rare and protected insect, but it was not difficult for my friend to convince me that it would do no harm providing I returned the butterfly after photographing it.



At home we made a small "rockery" in a large box; soil, plants and stones from the mountain slopes were arranged to make the natural environment for photographic work. This rockery was placed on the sunny balcony, and the caterpillar, which had pupated in its box, was put in a cavity under the stones. We guessed that the butterfly would not emerge in less than two weeks, but nevertheless we kept an eye on it.

There was nothing to notice at all on the pupa until the sixteenth day, when a faint pattern could be seen under the skin. On the morning of the nineteenth day there was a sign that the pressure inside the insect's body had increased, as the abdomen was distended. So we expected it to emerge soon, most probably before the afternoon. Butterflies and moths which fly during daylight emerge from the pupa during the daytime, particularly before noon.

It was a lovely hot day, and I had to abandon my outing to watch the butterfly. Everything was prepared to take the photographs, and I sat down in a deck chair to wait and hope. The time went on, minutes, hours, and nothing happened. About midday I was just giving up hope for that day when I noticed something moving in my rockery. There was my butterfly, but in such an unexpected shape that I could hardly recognise it.

With not much sign of wings it looked more like a big hairy spider running about very quickly on the stones. Soon it reached a tall grass, climbed to the top and there remained quietly. Its shape and behaviour are necessary for its survival. If its wings were bigger it could not leave its "hide" under stones or roots where as a caterpillar it walked in easily to pupate. If it did not run fast enough and climb up a tall plant it would soon be eaten by its predators such as lizards. So my freshly emerged butterfly now felt quite safe on the top of a slender cocksfoot stem, and I started to take photographs. I was very careful not to disturb it so as to be able to take serial photographs of its development.

A few minutes later slight contractions of its body indicated what was going on. It was increasing the pressure of its body fluid and pressing it into the veins of the wings. As the fluid entered, the wings gradually extended and I saw the lovely patterns appear and grow.

I took photographs at about five- or ten-minute intervals. In about half an hour all was over; the butterfly had its wings fully extended, but they were still soft and needed time for drying before they could be used.

The following day, which was the last day of my holiday, I took the butterfly back to the spot where we found it. As I opened the box to let it free, I found it motionless. It had died. I believe the sun made my rucksack—where it was kept—very hot. I was very sorry and kept quiet about it, and I ask you, please, do not tell anybody if you should go to the Vale Maggia what happened to the butterfly. My friends might hear about it and never invite me again.

I.C.I. NEWS

I.C.I. STAFF COLLEGE

An I.C.I. staff college, where future Company training courses will be accommodated, is to be opened in the spring at Kingston Hill, Surrey. The purchase of a large Victorian mansion there, Warren House, was completed on 29th September, when the former owner, Lady Leila Paget, G.B.E., handed over the keys to Mr. F. H. Perkins, I.C.I. Education Officer.

Lady Paget hands the keys of Warren House to Mr. Perkins. On the right is Cdr. Collett.

Warren House seen from the grounds

Warren House stands in 14 acres of grounds adjoining Richmond Park, and can be reached in 25 minutes by car from Millbank. When conversion work is completed it will accommodate about 34 people. A warden for the day-to-day administration of the college, responsible to the Education Officer, has already been appointed. He is Cdr. C. T. Collett, O.B.E., R.N. (retd.).

Warren House was built in 1884. King Edward VII stayed there more than once, and a tree in the grounds is marked as having been planted by him. Queen Mary, as Princess Mary, also stayed there on one occasion, when her own residence, White House in Richmond Park, was being repaired.

"A HISTORY OF TECHNOLOGY"

The first volume appears this month of a five-volume scientific work which has been made possible by an endowment from I.C.I.

Entitled *A History of Technology*, it will describe the techniques used by man, from half a million years ago to the nineteenth century, in making and doing things. Volume I opens with the humblest beginnings of the making and use of tools, including the most characteristic human tool called "language." It ends long before the Christian era, with descriptions of such marvels of technical skill as the inner coffin of Tutankhamen.

Some 130 authors will be contributing to the five volumes, and each volume will contain some 600 illustrations. The editors are Dr. Charles Singer, the distinguished author of many works on the history of science, technology and medicine; Dr. E. J. Holmyard, until recently editor of I.C.I.'s quarterly scientific publication *Endeavour* and the author of many textbooks on chemistry; and Dr. A. R. Hall, Fellow of Christ's College, Cambridge, and keeper of the Cambridge Museum of the History of Science, who is a well-known authority on the history of military engineering and the author of a recent work on the history of ballistics.

In their introduction to the first volume of *A History of Technology* the editors acknowledge their indebtedness to I.C.I. for the endowment which made the preparation of the book possible, and to Dr. C. J. T. Cronshaw, Dr. F. A. Freeth, Sir Wallace Akers and Mr. W. J. Worboys for their help and encouragement.

A History of Technology is intended primarily as a contribution to technical education, the five volumes being designed as a complete course of study to last about two years. It assumes a scientific equipment no higher than that of General Certificate of Education (advanced level).

It is published by the Clarendon Press. Volume I, price £5, will be followed by Volume II within the next few months, and publication of the remaining three volumes will probably be completed by 1956.

MR. A. N. DAVIDSON

We regret to announce the death on 1st September of Mr. A. N. Davidson, who retired as manager of the North Eastern Sales Division in 1946.

Mr. C. T. Ward, Joint Managing Director of Plant Protection Ltd., writes:

To say that the news of Mr. Davidson's death came as a great shock to many of his old colleagues in I.C.I. is merely to state the obvious. But how can I convey on behalf of his old friends what I am sure many of us felt when we heard the news?

To some he was contemporary, and maybe over the years of association enjoyed equal status; to many of us he was an immediate chief and leader; and to others he may have been just a chap one met in the course of the Company's business who may have agreed or disagreed with one's views—frequently he disagreed, and certainly he never left you in any doubt if this was the case. It is perhaps unfair that I should write this note, because I am biased. I have always been an "A.N.D." fan, because I am so conscious of what I owe to his early training. Brought up in the old school, he was a strict disciplinarian and a hard taskmaster: he would accept nothing less than an all-out endeavour on the part of every member of his staff. But he himself set an example at all times which few of us could ever hope to match.

His astuteness was a byword in the Company, and many is the time I have heard even his seniors say that if they had a commercial problem to discuss there was nobody they would rather go to than A.N.D.

And, finally, A.N.D. off duty. What a glorious companion and, as many of his old colleagues and I.C.I. customers will remember, what a host!

A grand man, as we say in the north: one who was loved by many and respected by all, whose influence will remain in I.C.I. until the youngest member of the staff who ever served under him has long since retired.

HEAD OFFICE

Mr. Sidney Rogerson Retires

Mr. Sidney Rogerson, who has been I.C.I. Publicity Controller since 1944, has retired from the Company. For the past two years he has been seconded to the War Office as adviser on publicity to the Army Council, and it was not until the end of August that he was released from this post. He is succeeded by Mr. B. W. Galvin Wright, who has been Acting Publicity Controller in Mr. Rogerson's absence and was Deputy Controller before that.

Mr. S. Rogerson

Mr. Rogerson joined I.C.I. in 1930 as Press Officer. He had previously been publicity manager for the Federation of British Industries, which he had joined in 1920 after war service in the army. He was appointed manager of the Central Publicity Department of I.C.I. in 1936 and Publicity Controller in 1944, when that office was first instituted.

During his time with I.C.I. Mr. Rogerson became one of the leading personalities in the publicity world. Although he left his decisive stamp on all the publicity media employed by I.C.I., there is no doubt that his great contribution to the Company's prestige was in pioneering a form of advertising that has since been emulated widely. The prestige advertisement, as it came to be called, was substituted for I.C.I. product advertising at the beginning of the last war, and under Mr. Rogerson's guidance the various series—"Aspects of an Industry," "Portraits of an Industry" and "Ancestors of an Industry" were among the first—made a remarkable impact on the public.

One effect of the prestige advertisements was to awaken the public mind to the basic importance of the chemical industry; another, even more important in time of war, was to keep British scientific success and initiative well to the fore in countries abroad. In the neutral press, particularly, the I.C.I. prestige advertisements were a by no means unimportant propaganda force.

Much of the credit for launching another I.C.I. wartime venture which has successfully continued in peace must also go to Mr. Rogerson. This was the magazine *Endeavour*, which he conceived as a powerful ally to prestige advertisements in the campaign to make known Britain's contribution to the sciences. To start such an ambitious periodical during the war, when supplies of paper were critically short and the consent of all kinds of officials was necessary, was the kind of project in which Mr. Rogerson's persuasive personality enjoyed full play.

Mr. Rogerson was particularly well suited for the task of "putting over" the army to the general public, for which he was lent by I.C.I. to the War Office, for he has always maintained a lively interest in military affairs. He was commissioned into the West Yorkshire Regiment straight from Cambridge in 1914 and served with the second battalion of the regiment and on brigade and divisional staff in France from 1916 to 1919. Between the wars he was organiser of the London branch of the West Yorkshire Old Comrades Association. His war experiences provided the theme for his first two books, *Twelve Days* and *The Last of the Ebb*, both of which enjoyed considerable success. Another side of his character is revealed by his two more recent books: *Both Sides of the Road*, about farming, and *Our Bird Book* (with Charles Tunnicliffe), which has established itself as a textbook for bird-lovers.

Editor of "Endeavour" Retires

Dr. E. J. Holmyard retired from the editorship of *Endeavour*, the Company's very successful international scientific review, on 31st August. He has been, however, something more than editor of *Endeavour*—he was in effect one of the principal architects of it. When, in 1941, the idea of a periodical dedicated to Britain's contribution to science was first put forward by I.C.I.—and at once warmly supported by the Government—there were no detailed plans for the form it should assume. Dr. Holmyard was allowed a very free hand, and the fact that comparatively few changes have been found necessary since the first issue appeared in 1942 is a tribute to the soundness of his judgment of the needs of the scientific world.

Dr. E. J. Holmyard
(Photo: Prof. H. E. Sigerist)

The great wartime success of *Endeavour* encouraged the Company to make its publication permanent. Today some 35,000 copies of each issue are published and sent to every part of the world; they are divided among English, French, Spanish, Italian and German editions, so that every scientist may have an opportunity of reading *Endeavour* in either his own language or one familiar to him.

Before joining *Endeavour* Dr. Holmyard was for many years head of the Science Department at Clifton College, and while there became well known both as an inspiring teacher of chemistry and as a writer of textbooks on science. The style of the latter was then something quite new—though it has since found many imitators—in that the reader was encouraged to learn not merely by the exceptional clarity and orderly arrangement of the writing but by the inclusion of many out-of-the-way pieces of information, the latter derived particularly from alchemical sources. Dr. Holmyard is an authority on medieval Arabic alchemical works; his deep interest in the history of science is reflected in the pages of *Endeavour*.

Although he has retired from the editorial chair of *Endeavour* Dr. Holmyard is not wholly severing his association with I.C.I., for he is continuing, with Dr. Charles Singer, his work as an editor of the Company's comprehensive *History of Technology*, the first volume of which is to be published shortly.

Dr. Holmyard is succeeded as editor of *Endeavour* by Dr. T. I. Williams, who has been deputy editor since 1945.

ALKALI DIVISION

On Foot to Work

The first marathon race ever to be staged by the Cheshire County Athletic Association was won by Mr. Donald Jones, a points oiler in Wallerscote Works Area 6 and a member of the Athletic Section of Winnington Park Recreation Club. The race, which was run in conjunction with the Liverpool Annual Marathon Race, attracted a total entry of 75—a third of whom did not finish the 26-mile course. With a time of 2 hr. 55 min. Don Jones finished 26th out of the total entry but was the first Cheshire runner home, to become the county title-holder; a very encouraging victory in his maiden marathon.

Mr. D. H. Jones

To attain the high standard of fitness necessary to win a marathon Mr. Jones had been training hard for many weeks, running regularly 60–70 miles a week. Much of this practice had been put in by running to and from his work, and his workmates at Wallerscote are now quite used to seeing him arrive at the Time Office in running shorts and singlet! He attributes a large part of his success at Liverpool to Norman Ashcroft, who works in the Instrument Department at Winnington and who has been his coach and inspiration.

A fellow member of the Athletic Section of Winnington Rec., Mr. Ashcroft has run many miles with Don Jones during his training; he also runs to work every day to keep in trim, for he is himself a long-distance and cross-country runner of some distinction. He represented England in the cross-country championships in Paris and in Belgium in 1947 and 1948. In this year's Windsor to Chiswick marathon race he came 17th out of an entry of 190 with a time of 2 hr. 36 min. over the 26-mile course.

Among the twenty-five runners forced to withdraw from the Liverpool marathon race was another member of the Alkali Division and of Winnington Rec. Athletic Section, Ray Harvey, who works in Winnington Research Department. Another of the "run-to-work" enthusiasts, he covers the seven miles each way between his home in Winsford and Winnington every day on foot.

And what of the future plans of these keen athletes? A programme of steady training lies ahead of them in preparation for the opening of the cross-country championships season in January.

BILLINGHAM DIVISION

New Bridge opened by Mr. Zealley

The importance of the part played by I.C.I. and its employees in the development of the Billingham Urban District was emphasised at a lunch which preceded the opening by Mr. A. T. S. Zealley, Group C Director on the I.C.I. Board, of Billingham Council's new Roseberry Road bridge.

Mr. Zealley opens Billingham Council's new bridge

The bridge has been built at a cost of £87,656 to link the Cowpen Lane, Haverton Hill and Port Clarence areas with the new Roseberry housing estate and civic centre. Mr. Zealley was invited to open it because of his long association with Billingham Council, of which he was a member from 1923 until 1948, and the work he did in helping to develop the district.

The opening was preceded by a lunch at which Dr. G. I. Higson, Billingham Division chairman, proposed a toast to Billingham Urban District. He said that in these days it was a good thing if people could live near their work; the great development of which the new bridge was a part would be of value to very many people, and he looked forward to still more of those who worked at Billingham living in the district.

In proposing the toast Dr. Higson said he wished continued prosperity to the district in which he had spent thirty very happy years.

The toast was replied to by Councillor L. H. Smith, chairman of the Council, who paid tribute to the early members of the Council whose vision had resulted in the development of the district.

He also referred to the part played by the Company in the growth of the community, and said "Without the I.C.I. factory there would not be Billingham as we know it today, and I cannot say anything that would be a greater tribute to the firm than that."

Mr. Zealley was introduced at the opening ceremony by Councillor W. Moreland, chairman of the Urban Council Development Sub-committee, who described the growth of Billingham from a district with 8000 people to a thriving community of 25,000.

Mr. Zealley said that he had been fortunate enough to be elected to the first Billingham Urban Council in 1923, and his years as a member had been a very happy experience which had been of very great value to him. Of the part he played in the early development of the district Mr. Zealley said that he and his colleagues were fortunate in that they were able to start with green fields and had worked in what today would be considered a town planner's paradise.

Award for Inventor

Mr. V. Fletcher, manager of the Plumbers' Sheet Iron and Tube Shops in Engineering Works, has received a substantial award in recognition of the work he has done to produce a machine which has already shown its value in the preparation of branch and main pipes in welded pipelines.

Behind the bare announcement is the story of many months of thought and work, both in and out of office hours, to produce a machine to do a job which is long and tedious when done by hand.

A prototype has been built in Engineering Works to cut and chamfer automatically mild steel pipes, preparing a profile of correct shape on a branch pipe and a hole of similarly correct shape in a main pipe in readiness for welding as a tee junction. It will also prepare segments for mitred bends.

The machine does the cutting and preparation in one operation, and a simple adjustment ensures that the shape of the branch pipe profile and the hole in the main pipe are such that they will fit perfectly.

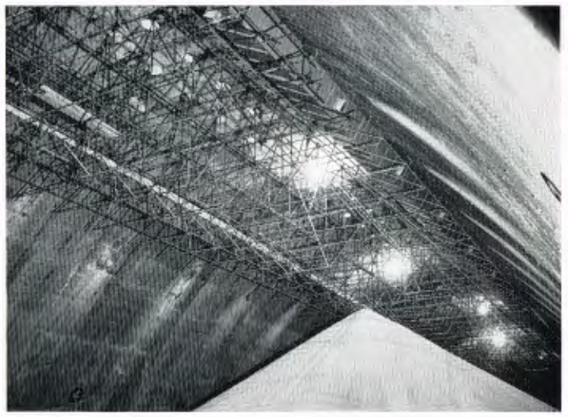
In order to obtain a perfect weld the angles of the two surfaces to be joined are important. On flat surfaces the angle is constant, but on curved surfaces it varies, and this variation is achieved automatically by the machine.

A perfect fit: Mr. Fletcher shows the results his invention can achieve in preparing joints for welding

The hand method is by using appropriately shaped templates. However good the operator, it is extremely difficult without long and tedious chipping and filing to secure a sufficiently accurate finish to ensure a first-class weld.

Apart from uniform accuracy inherent in a mechanical operation, the machine does the job, on average, in about one-tenth of the time in which it can be done by hand.

What is it?



It might be the inside of a Zeppelin's gas envelope. But it is not. It is a view of the interior of the 'Nitro-Chalk' silo at Billingham as it looked when urgent repairs were being done recently.

The collapse of part of the ventilating duct hangers presented an unusual problem—that of access for repairs and inspection. A normal working platform supported from the floor level was impracticable, owing to existing stocks and the build-up of stocks and the necessity for placing no large restriction on storage capacity.

The silo is 510 ft. long, 102 ft. wide at floor level with an arch height of 51½ ft., and the runs of ducting on both sides are at an average height of 43 ft. above floor level and 36 ft. apart.

A scaffolding company that was consulted undertook to suspend a structure from the top of the silo through 2 ft. diameter openings. They used 55,000 ft. of tubing, 10,000 miscellaneous fittings and 800 scaffolding boards on the job.

Rail Clerk teaches Russian

Mr. F. G. Penson, a clerk in the Rail Transport Section of Billingham Distribution Department, has a hobby in which he has in the course of many years' study become remarkably proficient: he is a linguist. He speaks French, German and Russian, and teaches Russian in the Stockton Technical College.

During the war Mr. Penson became attached to the Belgium Brigade in England, and subsequently went abroad with them. In these travels he touched France, Belgium, Holland and Germany. He used his knowledge of French, German and Dutch in his capacity of interpreter. Another language in which he became interested was Flemish.

His love of language began when he was at school, and he reached Higher School Certificate standard in French and German. After the war Mr. Penson also studied Russian and attained teaching standard. Apart from his travels during the war, he also spent holidays in France and Germany.

Mr. Penson has just completed 20 years' service at Billingham, and apart from all the studying he has done in connection with his hobby he has also passed Parts I and II of the Associate Membership examinations of the Institute of Transport, passing the final section of this examination last year.

CENTRAL AGRICULTURAL CONTROL

Presentation of B.E.M. to Mr. A. F. Buckle

On 15th September Her Majesty's Lieutenant of Berkshire, Mr. H. A. Benyon, visited Jealott's Hill Research Station to present the British Empire Medal to Mr. Archibald Frederick (Fred) Buckle. Mr. Buckle is in the Field Experiments Section at Jealott's Hill and has been employed there as an agricultural worker since 1928. He was awarded the medal in recognition of his services to agriculture in the last Birthday Honours List.

The presentation ceremony, which took place in the Research Station canteen, was attended by Mr. R. H. Muir, High Sheriff of Berkshire; Mr. W. P. Jarrett, Deputy Regional Controller of the Board of Trade; Dr. R. Holroyd, Research Director of I.C.I.; Mr. S. W. Cheveley, Chairman of Central Agricultural Control; Dr. A. H. Lewis, Director of Jealott's Hill Research Station; Mrs. A. F. Buckle, and over 100 of Mr. Buckle's colleagues.

In his speech of welcome Mr. Cheveley said it was a great privilege to have such distinguished visitors, particularly as two of them, Mr. Benyon and Mr. Muir, were farmers.

Before presenting the medal on behalf of Her Majesty Mr. Benyon congratulated Mr. Buckle on his well-deserved honour, which, he said, came at a particularly appropriate time following the celebration last year of the Research Station's twenty-fifth anniversary. He also handed to Mr. Buckle a personal letter from H.M. the Queen.

Mr. Buckle receives his British Empire Medal from the Lord Lieutenant of Berkshire

DYESTUFFS DIVISION

Pipped at the Post

On Saturday, 18th September, the six best chess players that the I.C.I. (Blackley) Recreation Club could muster set out for London to play in the final match of the first British Works Team chess championship, sponsored by the *Daily Herald.* It had taken six months and six matches to reach the final, but only in the semi-final against I.C.I. Kynoch had the team been fully extended; the Blackley team had won the second, third and fourth rounds with only half a point scored against them in each match, not losing a single game.

Their opponents in the final were the Royal Aircraft

(*Photo:* Daily Herald)

J. H. Markendale (left) plays E. G. Broadbent in the deciding match of the British Works Team chess championship

Establishment at Farnborough (R.A.E.), who fielded an extremely strong team.

The match proved to be most exciting. J. W. Batty was the first casualty, losing to D. J. McCae (R.A.E.); but I.C.I. hearts were lightened shortly afterwards by two excellent wins by A. Topham against H. W. Royce and L. T. Butt against A. Naysmith. When E. G. Ansell (I.C.I.) secured a draw shortly afterwards against A. C. S. Pindar (R.A.E.) both teams had secured 2½ points each. I.C.I. needed one more point to win, and two games were left unfinished. On board 6 E. Waters, who had been offered a draw by repetition against E. H. Bateman (R.A.E.), acting on team orders manfully tackled the job of looking for a winning line; he was eventually beaten by the clock and a fraction of a second.

The fate of the whole match then depended on J. H. Markendale (I.C.I.) and E. G. Broadbent (R.A.E.). At this stage Markendale had a small pawn advantage, which in happier days would probably have secured the win for him fairly comfortably; all the other contestants had now gathered round the last board and were watching with intense anxiety each move that the contestants were making. Markendale had been playing for no less than five hours, and was in a position when things looked bright for him, when he made a slight error of judgment. At that standard of chess a slight error of judgment is fatal: Blackley lost the game, the match and the tournament.

The Blackley team received a presentation set and board awarded to them as runners-up, and at the presentation there was a special word of congratulation for Dr. A. Topham. Dr. Topham had played in every round of the championship and had won all his games—the only 100% record in the whole of the tournament.

GENERAL CHEMICALS DIVISION

Mouse-hunting

From time to time a maintenance worker sallies out into the countryside between Castner-Kellner Works and the Wallerscote Works of Alkali Division on an unusual hunting expedition. His quarry: a mouse. His weapon: a stethoscope.

Hunting a mouse with a stethoscope sounds like a doctor's nightmare, but for the Castner-Kellner maintenance department it is all in the day's work.

The mouse is a wire-brush one, used to clean the 12½-mile pipeline which carries surplus lime-and-water slurry from the Carbide Plant to Wallerscote. It is necessary to follow the travel of the mouse and to locate it if it stops. This could be done by attaching a radioactive charge to the mouse's tail, but in practice it has been found simpler to listen for the sound of the slurry rushing past the mouse with a stethoscope similar to that used by a doctor on a patient's chest.

Maintenance workers B. Hulse and H. Tilston mouse-hunting with a stethoscope

LIME DIVISION

Retirement of Division Secretary

Mr. Adam Black, the Lime Division secretary, retired on 31st October after a wide and varied experience with the Company extending over 44 years.

Mr. A. Black

It was on 1st October 1910 that Mr. Black—then a youngster of 18—started his career with the Company by joining the Accountants Department of Nobel's Explosives Co. at Glasgow.

In 1920 he was transferred to London as chief accountant, Sports Ammunition and Powder Sales Department, Nobel Industries, and eight years later was appointed chief accountant of Nitram Ltd., London. In January 1930 he was transferred to Synthetic Ammonia and Nitrates as chief accountant on the liquidation of Nitram, and six months later was made chief accountant of Fertilizer Accounts Section of Treasurer's Department, Head Office. Transferred to Central Staff Department in December 1932, he remained there for nearly four years, when he joined Pensions and Assistance Funds Department and was appointed secretary of the various pension funds and I.C.I. Savings Bank.

On 1st March 1946 he was appointed Lime Division secretary and staff manager.

His experience of the pension funds was to prove invaluable shortly after he went to Buxton, for it was due largely to his talks at works council meetings and his advice at informal gatherings in the various works that the number of members withdrawing from the Fund when the rules were altered in 1946 was comparatively small in relation to the total membership in Lime Division.

Towards the end of 1946 he was appointed chairman of the Buxton Lime and Limestone Hospital Fund and remained in that office until 1950, when the fund was dissolved.

A keen golfer and a great lover of books, he will now have ample opportunity to indulge in his favourite pastimes. He leaves Buxton for Haslemere, Surrey, where he has bought a house with a fine garden.

Ardeer's "better barrow" in action. Left: Rolling a drum up the ramp formed by the handles. Centre: Normal progress of the barrow is comparatively effortless. Right: Unloading is a matter of a gentle push.

METALS DIVISION

Bonnets—Latest Style

The great variety of the Division's products has brought it into contact with many different trades and industries; but it will come as a surprise even to Metals employees to learn that the Division is now helping to make bonnets.

To be sure, the customer concerned is not a famous milliner, but a motor car manufacturer. The bonnets form part of the bodywork of the latest addition to the range of models produced by Singer Motors Ltd.—the Hunter Saloon—and are plastic laminates made by Marston Excelsior, Wolverhampton.

Visitors to the 1953 Motor Show will remember that Singers showed there a car with a complete plastic body. This was an experimental model, and Singers feel the time is not yet ripe to put the all-plastic body on the market. The Hunter Saloon, however, marks the first step in that direction by the use of plastic laminates for the bonnet and valances. This, according to press reports, not only gives a pleasing and satisfactory appearance but achieves a saving of one-third in the weight of these parts.

The Singer Hunter, with a plastic bonnet made by Marston Excelsior

NOBEL DIVISION

A Better Barrow

Handling heavy drums or barrels often causes strains or wrenches even in powerful men. A new type of barrow, designed by Mr. R. J. McD. Maxwell of Ardeer Physiotherapy Section, makes it easy to move loads of 7 cwt. or more with ease.

Mr. Maxwell employed in the new design his knowledge of "kinetic handling"—the handling of loads in a way that does not waste strength or abuse the muscles.

When the new barrow is put down in position, the drum, barrel or roll of paper can easily be rolled up the handles, which form a ramp. The man who is going to wheel the barrow lifts the handles, and finds himself helped in the process by the weight of the drum, which is centred over the axles. In the wheeling position the barrow can be manipulated with little effort, and to unload the operator merely pushes the barrow handles upwards and the drum rolls gently out.

On Time for Fifty Years

One day in 1904 a young girl named Agnes Spiers joined Nobel's Explosives Co. Her job was to solder electric fuses, at the rate of 6s. a week or 1s. 4d. a thousand; she could not choose whichever rate of payment was greater—she had to make up her mind beforehand which system of payment she preferred. Miss Spiers chose to be paid at 1s. 4d. a thousand, and so expert did she become that she frequently earned more than the adult workers in the factory, who got 19s. 2d. a fortnight.

Recently, at a ceremony at Westquarter Factory, Miss Spiers was presented with a letter from Dr. Alexander Fleck, Chairman of I.C.I., congratulating her on completing 50 years' service with the Company. She also received a congratulatory telegram from Mr. R. A. Banks, Personnel Director of I.C.I., a clock from her friends, and a Celtic brooch as a personal gift from Mr. A. P. Cattle, factory manager.

Miss Spiers was promoted to chargehand and examiner in 1918, and when the status of Staff Grade was established in 1931 she was an almost automatic choice for promotion. Mr. Leonard Gale, who presented Dr. Fleck's letter to Miss Spiers, said that during her long service there was no record

of her having been late even once. The Company, he said, owed much to the loyalty of such people as her. "Since she has stayed with us for fifty years," added Mr. Gale, "we cannot be a bad company to work for!"

New Cup for Ardeer Golfers

Golfers in Ardeer Factory have a new trophy which will engage their skill and interest once a year. This trophy, the Ardeer Golf Cup, has been presented for annual competition by Dr. J. W. McDavid, lately chairman of the Division. Once a year it will be played for over a well-known course under handicap rules.

In recent years Ardeer golfers have competed with other golfers in the Division's Scottish factories for the Johnstone Cup. Originally the Johnstone Cup was for competition among golfers in the headquarters offices. From now onwards it will revert to this original purpose, and Ardeer golfers will have the Ardeer Cup.

The first annual competition was played over the western course at Gailes on 10th September. The championship course was in splendid condition and presented a formidable though pleasant test of skill to all who played round its attractive yet difficult eighteen holes.

The man who will have his name first on the new cup is Mr. A. J. Wales, whose round of 79 (11) 68 was best by four strokes. Mr. W. McLaughlin won the scratch prize with a round of 76, which is very good golf indeed on Western Gailes.

I.C. (PHARMACEUTICALS) LTD.

Introducing 'Savlon'

Last month a new I.C.I. retail product was introduced to the public: 'Savlon' Antiseptic Cream. A household antiseptic which is recommended for a great variety of conditions, from burns to nappy rash, 'Savlon' contains as its active ingredient the well-known quaternary ammonium compound 'Cetavlon,' which has become firmly established in hospital and medical practice since it was introduced by I.C.I. ten years ago.

The operation by which 'Savlon' was put on sale in 15,000 chemists' shops simultaneously all over the country was one of the biggest and most intensive campaigns ever undertaken by the highly flexible I.C.I. selling organisation. "D-day" was 14th October; on that date advertising in the national press began, and it was essential that tubes of 'Savlon' should be available in every chemist's shop in the country. For weeks before "D-day" a specially trained force of I.C.I. representatives had been calling on chemists and securing orders, and a special offer to all chemists ensured that at least an opening stock was available in even the smallest pharmacy.

I.C.(P) has chosen this particular product for its first popular counter line because it is convinced that 'Savlon' meets a long-felt need for a household antiseptic that is effective in a great variety of circumstances: minor wounds and injuries, burns, scalds, skin disorders and so on. 'Savlon' is effective against a remarkably wide range of germs, and has the added advantage that it is absolutely safe and non-irritant, even to the most sensitive skin.

'Savlon,' I.C.(P)'s new antiseptic cream, is now available at chemists' shops throughout the country

A.E. & C.I.

'Luron' catches Tigers

This picture shows Mr. K. A. Sinclair, sales manager of A.E. & C.I.'s office in Salisbury, Southern Rhodesia, with his catch after a recent fishing expedition.

The fish are tiger fish, found in most of the big rivers in the low veld area of Rhodesia. They are brilliantly coloured, and have such sharp teeth that a strong wire trace must be used.

Mr. Sinclair made his catch in Salisbury's big new lake, Lake MacIllwaine. He adds: "The serious-looking youngster is my 7-year-old son, Trevor, and the line—'Luron' 2, of course!"

A day's catch in Southern Rhodesia

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OUR NEXT ISSUE

The next issue is our Christmas number, and in honour of the Feast of the Nativity we carry a large coloured reproduction of an English whalebone relief of the twelfth century depicting the Adoration of the Magi. This exceptionally beautiful work of art is one of the treasures of the Victoria and Albert Museum in London. There will also be a short article on the subject of ivory and whalebone carvings in the Middle Ages.

Our leading article is written by the Joint Overseas Director, Mr. E. A. Bingen. He writes on his own subject and explains how I.C.I.'s tremendous overseas interests with a turnover of some £160m. a year are watched and taken care of from the London end.

Then there are two other articles on the lighter side. Mr. John Dewar of Central Staff Department writes about a pastime at which he is most proficient—the ancient sport of curling, which like golf originated in Scotland and has now spread all over the world. And an old and valued contributor absent from these pages for too long, Mr. A. W. Baldwin of Dyestuffs Division, winds up the issue with characteristic humour in a story about his dachshund Mitzi.

Remembering Saturday

By Brenda Ellison (Metals Division)

Illustrated by Susan Einzig

SATURDAY when we were young was a wonderful day. Waking in the morning feeling clean and scented from Friday night's bath, hair shining and fluffy, and appetites anticipating the boiled egg and toast. With all thoughts of school cast aside we would hurry downstairs to read the "comics" with the new inky smell. At our respective places at the breakfast table were two pennies each. This ritual, observed by Father before leaving for work, convinced us that Saturday had really arrived.

The morning's shopping was much more exciting than the errands done during weekdays. There was the list of groceries written out by Mother whilst we stood first on one foot and then the other.

The instructions each Saturday never seemed to vary. A knitted bag for the loaves, the basket to carry flour, butter, sugar, etc., and always the cream cakes and Russian sandwich to be placed on top. Pungent groceries such as soap or onions were to be carried separately. Next, there was the PURSE! Oh, the excitement of the purse with the silver coins! In front under the flap was a note-case with brown tapes which crossed and straightened to hold the £1 and 10s. notes most magically.

The man in the grocer's always wore a cloth cap, a spotless white jacket and a huge white apron which fitted underneath his armpits and a tape which fastened, after winding round his thick middle, in a bow on his chest. He had a bird-like nose, and as he totted up the expenses reminded us of a white hen over a bowl of corn. He would take us unawares and with a beautifully sharpened pencil would rap our little knuckles as our hands rested on the counter, and then tease us as we rubbed them. A large black cat would purr against our bare legs, and as we knelt to fondle it he would say "Be careful of that dog. He bites!" and then laugh teasingly again.

What a silly man we thought he was! His only redemption in our eyes was the wonderful way he sliced the bacon. How we loved to watch as his hand came round the cruel blade on the machine to lay a perfect slice of pink and white bacon on to a greaseproof paper.

After Mother had checked our purchases our next assignment was the wheeling out of the village policeman's baby, which job seemed to keep us busy all through our schooldays, so there must have been quite a family! We loved the pram because it had a foot-brake, which we used at every available opportunity. Up and down the lane we walked, unnecessarily tucking in the baby and smiling and cooing, just as often stopping to talk to a school-friend. After his airing we would deliver our charge into his mother's care and skip gaily home, confident of the meal awaiting us.

On cold winter Saturdays we invariably fed on potato pie with a beautiful crust, or Lancashire hot-pot piping hot from a large brown dish. The delicious smell was temptation indeed to bolt the hot potatoes, whereupon we were admonished, but too late: we having burned our tongues in the hurried process.

Occasionally during winter we were allowed to visit the local cinema—Kinema was the proud name it boasted. We would eagerly set off to walk the mile journey to attend the children's matinée, clutching our precious pennies. We were more fortunate than some of the others, having our Saturday twopence from Father and an extra penny from the policeman's wife.

Sometimes the owner of the corrugated-roofed Kinema would give us a lift in his minute car. This was indeed a great treat, and how the poor man ever pushed the gangling legs of numerous children inside an Austin Seven has always remained a mystery. On arrival we would visit the sweet-shop and there indulge in ½d. worth of some sort of sticky caramel or nougat, which all but pulled our teeth from their sockets and left our tongues a lobster-like colour reminiscent of fever patients.

Once inside the picture-house, which was warm and dim, we paid the princely sum of 2d. for a red plush seat with arms from which the plush had worn away at the corners. The majority of children sat nearer the screen, having parted with only one penny. They were perched on ribbed seats with no back-rest. Quite often in their excitement they would push over the forms, and what a commotion there was! The man who walked round to keep the peace, wearing a felt hat, would come along enquiring who had started the trouble.

Eventually quietness would reign except for an occasional piping voice reading out the captions on the screen. We followed the adventures of cowboys, Red Indians, Tarzan and his animals, and a host of others. An exhilarating march would be churned out by the pianist behind the red curtain and out we would go, stamping our feet in march time.

The homeward journey was done at a steady trot, our young minds filled with the thoughts that we were prospectors in the Wild West cantering into virgin country. As we neared home across the fields we would suddenly remember that Saturday's tea on a winter's afternoon consisted of hot muffins and crumpets, grilled sausages and bacon, stacks of home-baked bread, and fruit cake. In we would burst, our cheeks red and glowing, holding our hands to the friendly fire.

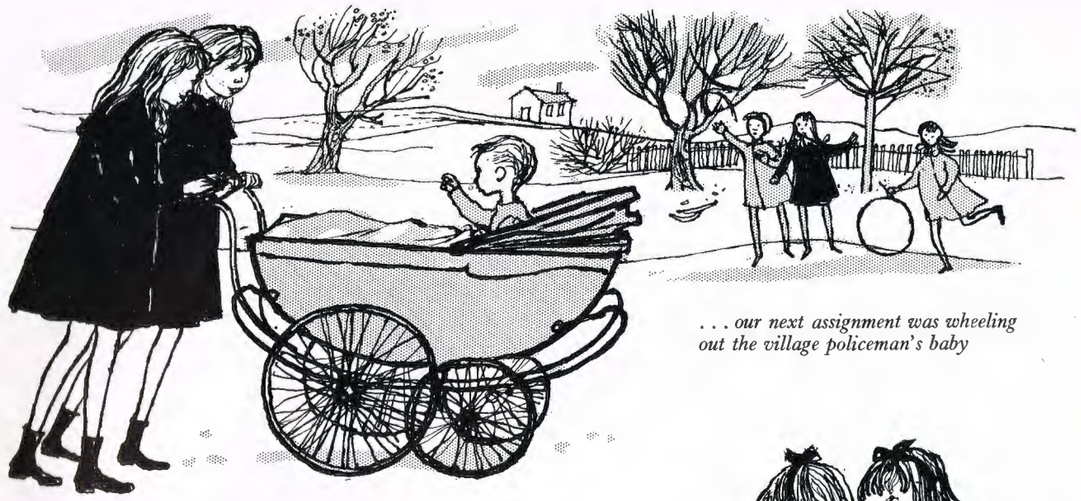
Could we recount the hero's adventures in the afternoon's film? We were told by Father to wait please until after tea. By that time, however, we were intent on bringing out our library books—usually of school stories, haunted manors or far-off islands.

We would curl in front of the fire or lean against Mother's legs while she knitted, discussing with Dad grown-up worries such as indigestion, sleeplessness, economising, shabby school gym slips and growing girls. Dad would occasionally try our general knowledge with the crossword he often did, and although we tried to please him, by this time Nature would be claiming us and Mother would utter the well-known words: "time for bed."

We tried denying we were tired, pleading that it was Saturday and that we *would* be ready for church in the morning; but all this was of no avail, and after our goodnights were said and we were safely upstairs, we would slip into our nightdresses, kneel to thank God for His blessings and then, healthily tired, jump into bed.

The light out, we would murmur "Isn't Saturday a lovely day!" and gently drift into sleep, with no thought of the morrows which came six times before the next Saturday but sure in the faith that Saturday would come again to be enjoyed in just the same happy way.

. . . Saturday morning's shopping was much more exciting than the errands done on other days



. . . our next assignment was wheeling out the village policeman's baby

. . . kneel to thank God for His blessings

. . . Saturday's tea on a winter's afternoon consisted of hot muffins and crumpets

Outside Buckingham Palace

Photo by S. Crafer (Southern Region)